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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,501	06/30/2003	Robert S. Wegeng	13025E-DIV	1736

7590

12/17/2004

Frank Rosenberg
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EXAMINER

LAWRENCE JR, FRANK M

ART UNIT	PAPER NUMBER
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1724

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/609,501

Applicant(s)

WEGENG ET AL.

Examiner

Frank M. Lawrence

Art Unit

1724

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 18-22, 24-27, 31 and 36 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 22 and 24-27 is/are allowed.
- 6) ☒ Claim(s) 1, 3, 6, 18 and 20 is/are rejected.
- 7) ☒ Claim(s) 2, 4, 5, 7, 19, 21, 31 and 36 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Apparatus for Thermal Swing Adsorption and Thermally-Enhanced Pressure Swing Adsorption.

Information Disclosure Statement

2. Applicant is requested to submit an information disclosure statement listing the references cited in the parent application, 09/845,776. Copies of the references need not be supplied because they are present in the parent application file.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 18 is rejected under 35 U.S.C. 102(b) as being anticipated by Arnold et al. (5,802,870).
5. Arnold et al. '870 teach a sorption cooling system comprising six adsorption/desorption cells wherein each cell comprises a layer of adsorption channel filled with adsorption material having a thickness of 0.1-3 mm in thermal contact with a heat exchanger, and wherein each cell

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heat exchanger is connected by conduits to a heat source, cold source, and the heat exchangers of other cells (figures, col. 9, lines 8-21, claims 1-7, 19).

6. Claims 1 and 3 are rejected under 35 U.S.C. 102(e) as being anticipated by Dolan et al. (6,293,998).

7. Dolan et al. '998 teach an adsorbent module for use in a thermal swing adsorption process where a gas to be adsorbed enters the adsorbent directly through an inlet, comprising an adsorbent paper layer coiled adjacent to an inherently thermally conductive heat exchange layer for selectively supplying cool heat exchange fluid to a direct-contact adsorption phase or a hot heat exchange fluid to a desorption phase. The adsorption paper is disclosed in the referenced patent to Belding et al. (5,650,221) as having a thickness of 0.1-0.51 mm and the heat exchange layer is relatively thinner in a range of 200-2000 microns (see figures) allowing intimate contact with a heat exchange distance of less than 2 mm. Up to 10 layers of the adsorbent paper can be stacked. The adsorbent paper can be considered to be plastic or felt as it is flexible and can be made up of acrylic or aramid fibers containing adsorbent particles with a metal foil between the paper and heat exchanger. The heat transfer fluid can be water (figures, col. 9, lines 1-19, col. 10, line 4 to col. 11, line 18).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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9. Claims 6 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dolan et al. '998.
10. Dolan et al. '998 disclose all of the limitations of the claims except that the apparatus has specified CO₂ adsorption properties under certain process conditions and that the heat exchange fluid has a heat transport time of no greater than 10 seconds. It is submitted that the adsorption properties and heat transport time are considered to be parameters that would have been routinely optimized by one having ordinary skill at the time of the invention in order to provide the most efficient adsorption characteristics in a given application.
11. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rhodes (4,793,143).
12. Rhodes '143 disclose a thermal swing gas adsorption process for an air conditioning system, comprising the simultaneous steps of adsorbing moisture from air on a first desiccant, selectively transferring cold heat transfer liquid to the first desiccant, desorbing a second desiccant bed, and selectively transferring hot heat transfer liquid to the second desiccant. The adsorbent beds comprise a 3 mm thick silica gel desiccant that is coated on the walls of a channel formed by the tubes and fins of a serpentine heat exchanger, allowing a heat exchange distance of less than 1 cm between center lines of the desiccant and the fins or tubes of a common radiator exchanger. The tubes can have a diameter of 0.6-1 cm. The instant claim differs from the disclosure of Rhodes '143 in that the heat exchange fluid has a heat transport time of no greater than 10 seconds. It would have been obvious to one having ordinary skill in the art to optimize the heat transport time for the same reason discussed in paragraph 10 above.

Allowable Subject Matter

13. Claims 22 and 24-27 are allowed.
14. The following is an examiner's statement of reasons for allowance: The prior art of record fails to disclose or suggest a multi-cell sorption pump as defined in claim 22, wherein each sorption cell can cycle thermally from adsorption to desorption and back to adsorption by sequentially receiving heat from at least two other sorption cells prior to receiving heat from the heat source, and then sequentially giving up heat to at least two other sorption cells prior to giving up heat to the heat sink. The closest prior art to Arnold et al. '870 discloses a similar apparatus but fails to suggest a motivation for providing such a capability.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

15. Claims 2, 4, 5, 7, 19, 21, 31 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional references listed on the attached PTO-892 form disclose adsorption devices.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frank M. Lawrence whose telephone number is 571-272-1161. The examiner can normally be reached on Mon-Thurs 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Frank M. Lawrence
Primary Examiner
Art Unit 1724

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Frank Lawrence
10-27-04